Period: Date: Name:

24.1 Calculating Frequency and λ

Table 1

Color	Wavelength (λ) (nanometers)	Frequency (f) (Hertz) *based off low λ value
Violet	380 – 440	7.9×10^{14} Hz
Blue	440 – 500	
Green	500 – 560	
Yellow	560 – 590	
Orange	590 – 640	
Red	640 – 750	

(m/s) (Hz) (m)

$C = f \lambda$

$f =$

λ

One nanometer is 10^{-9} meter, so 380nm = 380×10^{-9} m or 3.8×10^{-7} m

#'s 1-6: Calculate the frequency of each color using the **low λ value**. (Use the formula for 'f' from your notes. c = 300,000 Km/s (300,000,000 m/s OR 3x(10^(8)) m/s)). Then copy each color's frequency into the appropriate space in table 1.

EX

1. $f = C/\lambda$ $\lambda = 380\text{ nm} = 3.8 \times 10^{-7}$ m $C = 3 \times 10^{8}$ m/s

Violet

$f = (3 \times 10^{8}\text{ m/s}) / 3.8 \times 10^{-7}\text{ m} =$ $\boxed{7.9 \times 10^{14}\text{ Hz}}$

2.

3.

4.

5.

6.

7. Which color has the longest λ?

8. Which color has the shortest λ?

9. Which color has the highest frequency?

10. Which color has the lowest frequency?

11. Using a normal radio, could we "tune-in" to the color violet's frequency, and "hear" the color violet? Explain your answer. (Research how a radio works)

12. Calculate the λ of a wave with a frequency of **5.7×10^{14} Hz.** (300,000 Km/s = 3×10^{17} nm/s)

13. What color corresponds to the λ calculated in #12?

14. Calculate the speed of light in nm/s using the λ and frequency from #12.

15. What happens to the λ of an electromagnetic wave as the frequency decreases?